

Dynamic Evolution of Cognitive Maps of Newcomers in Urban Area

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Introduction

Already for several decades the concept of cognitive maps is widely accepted in different disciplines such as transportation, urban planning and urban design. The term 'cognitive map' refers to the individuals' internal spatial knowledge about experienced environment. The majority of these studies recognize the twofold nature of the relationship between individuals' cognitive maps and spatial behaviors: on the one hand cognitive maps play a crucial role in decision making in urban environments, on the other we learn about the environment over time while traveling, updating cognitive maps.

Furthermore, in the field of activity-based modeling the focus has shifted from cross-sectional toward dynamic models, which involve learning processes. In this context, any activity-based model is incomplete if it does not integrate how individuals' cognitive maps evolve over time. To that effect, the focus of this paper is concerned how cognitive maps of individuals evolve over time as a function of activity-travel behavior. The contribution of this paper is twofold. First, it offers a methodological contribution to empirical techniques how to collect information on dynamic formation of cognitive maps knowledge over time. Second, it provides conceptualisation how urban experience effects what spatial information individuals perceive and store in their memory. In particular the study offers an improved understanding what landmarks, distinct areas, locations and elements of transportation network individuals perceive and cognize over time during urban experience.

Method

For understanding the relationship between spatial knowledge acquisition and activity-travel behavior of individuals the

approach taken in this study is to combine qualitative and quantitative techniques for analyzing space-time behaviour of a sample of newcomers to Eindhoven, the Netherlands.

Tracking technology GPS logger Bluetooth A+ was utilized to collect data during 12 weeks on activity-travel patterns of 28 newcomers [Moiseeva, 2010]. For capturing the evolution of cognitive maps participants were asked to draw a map of Eindhoven 3 times during study with a 4 week interval. An internet survey was designed to measure personal awareness, perceptions, personal considerations why the location was chosen and overall evaluation of certain public locations. Respondents were asked to complete the survey 3 times after drawing a map of Eindhoven.

Results

The results showed that cognitive representation becomes more complex over time and the number and variety of the learned locations increases at a decreasing rate over time. The accumulated level of interaction significantly affects the complexity and accuracy of the cognitive representation and varies between respondents. The key landmarks perceived by the majority of the respondents repeatedly appear over time in the first ten-fifteen locations; in contrast some previously learned locations fade or receive less importance because activities were not repeated or became habitual nature. It suggests that in the beginning newcomers adopt exploration to learn their environment, and that once better informed, they tend to get involved in more routine-types of activity-travel behavior.

References

Moiseeva, A., Jessuran, J & Timmermans, H.J.P. (2010). *Journal of the Transportation Research Board*, 2183, 60-68